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beads and small pebbles. These and the moccasin-shaped pot were found by the side of the skeleton (No. 66) of a child, at a depth of four feet.

With some of the skeletons were found indications of the presence of wood, as though they had been covered or surrounded with wood in some form.

CYRUS THOMAS.

WASHINGTON, D. C., April 25th, 1885.

MEMORANDUM ON THE MOUNDS AT SATSUMA AND ENTERPRISE,
FLORIDA.¹

Having an opportunity, recently, of visiting the celebrated shell mound at Old Enterprise on Lake Monroe, I availed myself of it in order to satisfy my curiosity in regard to certain points connected with its construction. In this examination I developed certain facts which seem worthy of being put on record, as they will to some extent modify the inferences, in regard to the construction of these mounds, which might be drawn from the admirable monograph of Wyman.

It will be understood, of course, that my remarks relate only to the particular mounds which I have examined, though perhaps they may prove of wider application.

The present state of the mound at Old Enterprise is one of dilapidation. Man erected it and man is digging it up and carrying away its materials. It is situated on land belonging to the De Bary estate and is fenced in, but the material is used in fertilizing orange groves and making shell walks; and, by the owners, or with their permission, probably two-thirds of the mound has been carted away. The work of destruction, at all events, gives an excellent section of the mound down to its very foundations, and however deplorable it may be on other grounds was certainly a great help to me in determining its structure.

The mound is smaller than Wyman's frontispiece would lead one to believe, a misconception which has been brought about unintentionally by the artist, and which might have been remedied by putting a human figure in the foreground. Though it has extended about one hundred and fifty feet along the lake shore, its width at right angles to that direction could not have exceeded fifty feet, and was probably less. The margins were originally so steep as to be difficult to scale except by the

¹ Communicated by permission of the Director of the Survey, Major J. W. Powell.

path intended for ascent, but only a few yards of the original slope now remain and these will soon be dug away.

The mound is situated just to the eastward of the point where a considerable stream enters the lake, forming the outlet of the beautiful Green Sulphur Spring which lies a few rods inland. North of the mound a triangular piece of swamp extends from near the stream, which its apex nearly reaches, to a little bay four or five hundred yards to the eastward, where the base of the triangle may be a hundred yards in breadth or more. This swamp is too soft to cross on foot and full of saw palmetto, reeds, etc., growing in hummocks separated by water and semi-fluid mud. It is being cleared and drained and will soon cease to exist, but, as the mound originally stood, must have nearly isolated it from firm ground and formed an excellent defense against attack from that direction. Moreover in this swamp lived the mollusks whose shells have been so important in the construction of the mound. Westward from the mound and north-westward from the swamp lies an orange grove and some woods, the land gradually rising from the lake. The soil is composed of a layer two or three feet thick of beach sand, humus, and an admixture of muddy matter derived from the swamp which was once more extensive in this direction. The surface of the ground is covered with shells from the mound which have arrived there in three ways. Some have been carted over and spread about as a fertilizer; much has been washed along the shore by storms and thrown up by the waves on the banks, and some of the shells, particularly the more perfect ones, are so round and light that they have simply been blown by the wind from the sides of the mound, scattered for a mile or two over the surface near the sandy beach, but not carried inland further than open spaces in the shrubbery would permit a brisk breeze to blow.

Deep trenches have been dug in the orange grove to drain the ground between the rows of trees. Into these trenches a certain number of the shells from the surface have been blown or have fallen. Besides these, however, at a depth of two or three feet from the surface is a layer of mud, full of shells of all sorts and which appears to be a westward extension of the present swamp. This marl and mud appeared to be about two feet thick in most places, and rest on a hard aeolian sandstone, resembling the phosphatic rock of western Florida in appearance, but much younger in age, being full of recent land shells. In this formation Pourtalès and Wyman found human bones imbedded, at Rock Island, in Lake Monroe. Behind the sand of the beach, a little lagoon was originally formed, in which gradually accumulated the mud from decaying vegetation, brought down by the streams or growing on the spot. Here flourished the *Unios*

Viviparas, etc., and in time formed a bed of mud and marl. Upon this the wind blew sand from the beach, and in this way the dry land has grown. The marl in position is rather soft, but when well drained it becomes very hard, almost forming a stone. The shells in it are just as they died, large and small, mostly in good condition, except the *Unios* which are more perishable than the univalves and always less perfect. The *Viviparas* are thin and light but very strong, and a layer of them will sustain a weight of one hundred and fifty pounds without breaking. Owing to the air they contain, they are very buoyant and a compact layer four inches thick, spread over the soft mud of the swamp, will sustain the weight of a man, a fact which I personally tested. Beside the whole shells, there is a large amount of broken and decayed shelly matter. The large *Ampullarias* are very fragile, and may have been broken up, but at all events are very rare in the marl. I saw no perfect ones.

The shore and bottom of the lake near the mound, and as far as could be observed into deep water, are composed of clear, sharp sand, affording no food or resting place for mollusks, and neither dead nor living ones are found in it, except such as may have been washed from the mound. The mound itself probably stands partly on the original sea-beach and partly on the swamp. The way in which its materials have been scattered about prevented the attainment of certainty in the matter, but the above suggestion accords with what was observed. About two-thirds of the mound have been dug away nearly to the level of the beach. In 1848 the bluff where the storms had washed away the lakeward slope was fifteen feet high. The summit of the mound was about five feet higher, and on it an early settler built a small house, which at one time served to accommodate the occasional traveller. All traces of this are now gone, and in fact the part of the mound on which it stood is believed to have been entirely dug away. The nearly vertical face from which excavations have been made offers an excellent means of inspecting the structure of the mound. The sides and base are buried in a talus almost exclusively composed of the shells of *Vivipara georgiana* Lea (formerly called *Paludina*), which have weathered out of the general mass and owing to their form and strength have resisted decay. To the casual visitor this talus would give the idea that the mound was composed of clean *Vivipara* shells, which would be a very erroneous notion. After clearing away the talus it is evident that the body of the mound is formed of mud and marl resembling that previously described as underlying the orange grove and which I am convinced was brought to the spot from the swamp to build the mound of. Sand from the beach would be liable to washed or blown away at any time and the marl was but a few yards

away. The main mass, especially toward the base of the mound, is composed of this material unstratified and rendered almost as hard as stone by the percolation of lime water. At about half the height of the mound slight indications of stratification are apparent here and there, small layers of clean shells, *Vivipara* or *Ampullaria*, are visible, an inch or two thick and a yard or two long in section, as if the shells from a repast had been thrown out. Bits of charcoal, occasional fish and other bones are more abundant as we ascend. I did not succeed in finding a single artificial article of aboriginal origin in all the exposed area and talus after a careful search. About two feet and a half below the surface in the compact material I found one or two pieces of glass which had been subjected to the action of fire and which by age had become beautifully iridescent. It had been originally quite thin and of pale greenish color, like that used for cheap looking-glasses such as are used in Indian trade. It may, however, have been a relic of the early white settlers before referred to, though the depth to which it was buried is adverse to this idea.

I collected of the rough material composing the mound, about four feet below the surface, enough to fill a box such as holds 100 cigars. This weighed about five and a half pounds and four and a half pounds of it was broken up, the contained shells sorted and identified with the following result, the identifiable shells of each species being counted :

<i>Vivipara georgiana</i> Lea,	313
<i>Melania etowahensis</i> Lea,	109
<i>Amnicola</i> sp. indet.,	1
<i>Unio Buckleyi</i> Lea (valves),	30
<i>Unio</i> species indet. (valves),	5
<i>Ameria scalaris</i> Jay,	4
<i>Glandina truncata</i> Say,	1
<i>Helix</i> (<i>Polygyra</i>) <i>auriformis</i> Bld.,	1
<i>Zonites minuscula</i> Binney,	13
<i>Zonites arborea</i> Say,	1
<i>Zonites</i> (<i>Conulus</i>) <i>chersina</i> Say,	1
<i>Pupa contracta</i> Say,	2
<i>Pupa rupicola</i> Say,	14

Total, thirteen species and four hundred and ninety-five specimens of mollusks beside a fragment of a marine shell (a *Cardium*) too small to identify specifically, several fish scales, two pieces of fish bones and one piece of mammalian bone unidentifiable. The shells tabulated all live in the vicinity at the present time, but are not abundant owing to the drying up of the swamp or other causes. At suitable localities about the

lake they are believed to be abundant as ever, at the proper season, *i. e.*, midsummer. Of all the above mentioned species, only the *Vivipara* and *Unios* have ever been considered edible, most of them are far too minute for food. The *Ampullarias* (*A. depressa* Say) which, as before mentioned, are not disseminated through the mass but found assembled together in small patches, were therefore probably gathered elsewhere, perhaps at no great distance, and those in the mound are doubtless solely relics of dinners. The assemblage is just what we might expect in a fluvial marl and a similar assemblage would doubtless be found in a similar mass of the marl from the orange grove.

My conclusion, therefore, is that the mound was artificially constructed as a post of observation (for which it is otherwise peculiarly well situated) a dwelling site, fortification against attack or flood, or for some other purpose requiring a dry or elevated site. That the building up, after high water mark was passed, was intermittent and the materials supplemented by kitchen midden matters, and that the gradual elevation continued until about the time it was abandoned. The theory that it is solely derived from the relics of dinners, etc., seems untenable, for the following reasons.

1. The character of the main mass, of which it is composed, as above described ; 2, the original steepness of the sides, too great to have been the unintentional result of throwing out small quantities of empty shells ; 3, the improbability that the builders would squat in a marsh, or on a beach subject to overflow, until their refuse had built them a dry site in spite of themselves ; 4, the small area of the top, which renders it highly improbable that the dinner refuse of all who could sit on it could have made such a mound in many centuries ; 5, and lastly the fact a material similar to that of which the mound is composed is close at hand and offers no difficulties to any one desiring to get it. I should add that Mr. Lebaron, an engineer who contributed to the Smithsonian Report of 1882 an interesting list of Mounds observed by him in Florida, came on other grounds to a similar conclusion with regard to this mound.

THE SATSUMA MOUND.

This mound is situated on the bank of the St. John's river, about 20 miles south of Palatka, near a small new settlement called Satsuma. I did not visit it but examined a large scow-load of material brought from it to Palatka for shell walks, etc. I was informed that it was about twenty five feet high and one hundred feet long along the bank, with a swamp behind it. An examination of the material showed a similar assemblage of species, many of which could not have been gathered for

food or any practical use. The consolidated material was also like that at Enterprise and I was led to suspect from these facts that the Satsuma mound might have been, like the former, artificially constructed of mud from an adjacent swamp, this material being supplemented more or less abundantly by the relics of dinners.

The question having been recently discussed as to the use by existing residents of Florida of the fresh-water shells of the region for food, and it having been incidentally stated by Wyman that the Florida "crackers" eat the *Paludina* (*Vivipara*) and *Unio*, I made careful inquiries among this class of people during my stay and found that none of them had ever heard of eating the *Vivipara* and only in one case had *Unio* been tasted, and then as a matter of curiosity which was so well satisfied that the old man said that "if the Lord would forgive him for that one he would never try another." The error appears to have arisen from the fact that both the marine and fresh-water spiral shells are called "conchs" by these people, and the marine shells are not unfrequently used for food like "winkles" in Great Britain; so that Wyman was led to believe that both were commonly eaten, which is certainly not the case.

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